

Anadarko Petroleum Corp.

Weld County, CO (NAD 83)

Sec. 2-T2N-R65W

GREENLEAF 29N-2HZ

Plan A

Design: Actual Surveys

Sperry Drilling Services

Final Report

25 March, 2015

Well Coordinates: 1,302,935.59 N, 3,241,922.08 E (40° 09' 42.16" N, 104° 38' 03.84" W)

Ground Level: 4,854.00 usft

Local Coordinate Origin:

Viewing Datum:

TVDs to System:

North Reference:

Unit System:

Geodetic Scale Factor Applied

Version: 5000.1 Build: 73

Centered on Well GREENLEAF 29N-2HZ

RKB = 13' @ 4867.00usft (Ensign 145)

N

True

Dec-Deg - API - US Survey Feet - Custom

HALLIBURTON

Project: Weld County, CO (NAD 83)
 Site: Sec. 2-T2N-R65W
 Well: GREENLEAF 29N-2HZ
 Wellbore: Plan A
 Design: Actual Surveys



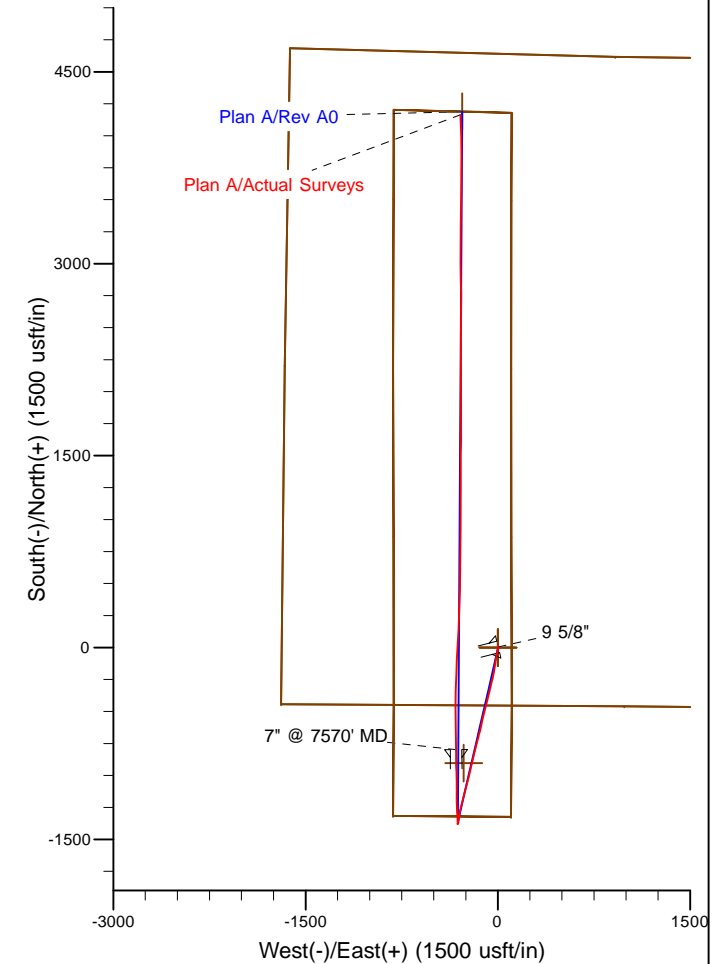
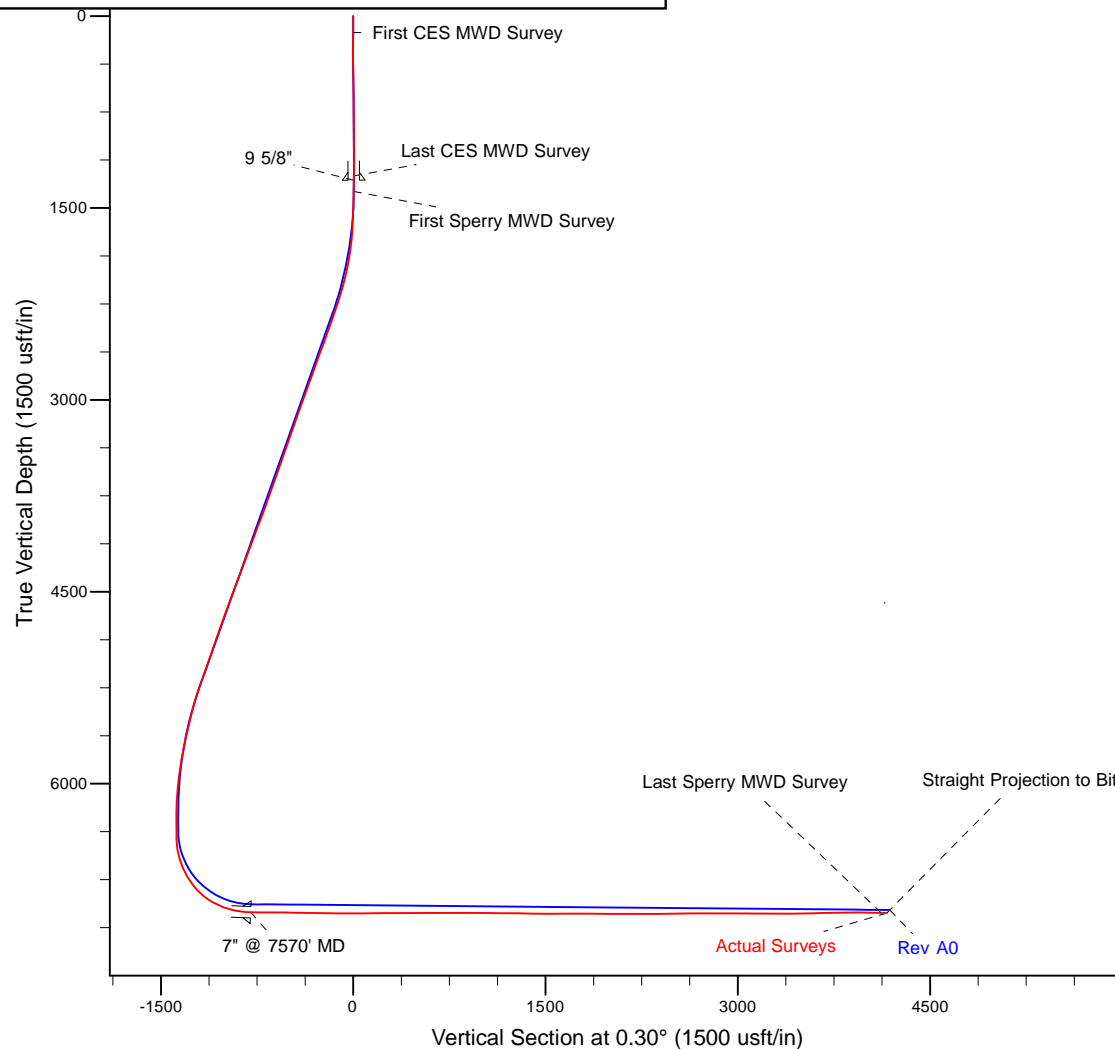
Platted SHL: 453' FSL, 1686' FWL
 Platted Lat/Long: 40.161712N, 104.634400W
 Location: Sec. 2-T2N-R65W

~ 7" Casing: 354' FNL 1379' FWL
 Lat/Long: 40.159521N, 104.635563W
 State Planes - CO Northern: 1302134.29N, 3241604.72E
 Location: Sec. 11-T2N-R65W

~ BHL: 488' FNL, 1341' FWL
 Lat/Long: 40.173140N, 104.635444W
 State Planes - CO Northern: 1307095.60N, 3241589.68E
 Location: Sec. 2-T2N-R65W

LEGEND

- GREENLEAF 29N-2HZ, Plan A, Rev A0 V0
- Actual Surveys



WELL DETAILS: GREENLEAF 29N-2HZ

Ground Level: 4854.00
 RKB = 13' @ 4867.00usft (Ensign 145)

Created By: Gordy Roth
 Created On: 3/25/15

Design Report for GREENLEAF 29N-2HZ - Actual Surveys

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
129.00	1.70	117.80	128.98	-0.89	1.69	-0.88	1.32
First CES MWD Survey							
208.00	1.00	142.70	207.96	-1.99	3.15	-1.97	1.14
287.00	0.80	120.70	286.95	-2.82	4.04	-2.80	0.50
367.00	1.00	334.90	366.95	-2.47	4.22	-2.45	2.15
447.00	1.20	350.10	446.93	-1.01	3.78	-0.99	0.44
527.00	1.30	333.20	526.91	0.62	3.23	0.64	0.48
607.00	0.80	339.00	606.90	1.95	2.62	1.97	0.64
687.00	1.20	325.30	686.89	3.16	1.94	3.17	0.58
767.00	0.20	132.50	766.88	3.76	1.57	3.77	1.74
847.00	0.50	66.00	846.88	3.81	1.99	3.82	0.57
927.00	0.20	169.90	926.88	3.81	2.33	3.82	0.73
1,007.00	0.40	74.30	1,006.88	3.75	2.63	3.76	0.58
1,087.00	0.30	137.60	1,086.88	3.67	3.04	3.69	0.47
1,167.00	0.30	1.40	1,166.88	3.72	3.18	3.74	0.70
1,250.00	0.50	59.60	1,249.87	4.12	3.50	4.14	0.51
Last CES MWD Survey							
1,372.00	0.38	146.00	1,371.87	4.06	4.19	4.08	0.50
First Sperry MWD Survey							
1,466.00	1.30	182.94	1,465.86	2.74	4.31	2.76	1.09
1,559.00	2.33	185.28	1,558.81	-0.20	4.08	-0.18	1.11
1,653.00	4.60	191.46	1,652.64	-5.80	3.15	-5.78	2.44
1,747.00	6.11	195.53	1,746.22	-14.31	1.07	-14.31	1.66
1,841.00	7.36	193.90	1,839.57	-24.98	-1.72	-24.99	1.35
1,934.00	10.80	192.47	1,931.39	-39.27	-5.03	-39.30	3.71
2,028.00	13.55	191.88	2,023.27	-58.65	-9.20	-58.70	2.93
2,121.00	15.61	188.61	2,113.27	-81.69	-13.32	-81.76	2.38
2,214.00	17.97	189.30	2,202.30	-108.22	-17.51	-108.31	2.55
2,307.00	18.29	187.10	2,290.69	-136.86	-21.63	-136.97	0.81
2,401.00	20.77	191.02	2,379.27	-167.86	-26.64	-168.00	2.98
2,491.00	19.60	189.24	2,463.75	-198.43	-32.12	-198.59	1.47
2,581.00	20.55	191.71	2,548.28	-228.79	-37.75	-228.99	1.41
2,671.00	20.56	195.73	2,632.55	-259.47	-45.24	-259.71	1.57
2,761.00	19.84	195.70	2,717.02	-289.39	-53.66	-289.67	0.80
2,851.00	20.34	193.68	2,801.54	-319.29	-61.49	-319.61	0.95
2,941.00	20.71	192.20	2,885.83	-350.04	-68.55	-350.40	0.71
3,031.00	20.44	191.07	2,970.09	-381.02	-74.93	-381.41	0.53
3,121.00	20.55	194.88	3,054.40	-411.71	-82.01	-412.13	1.49
3,211.00	19.11	193.35	3,139.06	-441.31	-89.46	-441.78	1.70
3,301.00	20.16	192.62	3,223.82	-470.78	-96.25	-471.28	1.20
3,391.00	19.91	197.17	3,308.38	-500.56	-104.17	-501.10	1.75
3,481.00	20.43	194.43	3,392.86	-530.41	-112.61	-531.00	1.20
3,571.00	19.95	193.02	3,477.33	-560.59	-119.98	-561.21	0.76
3,661.00	18.75	190.90	3,562.25	-589.75	-126.17	-590.40	1.54
3,751.00	19.96	191.19	3,647.16	-619.03	-131.89	-619.71	1.35
3,841.00	20.44	194.38	3,731.63	-649.32	-138.77	-650.04	1.33
3,931.00	19.13	193.81	3,816.31	-678.86	-146.20	-679.62	1.47
4,021.00	21.76	195.27	3,900.64	-709.28	-154.11	-710.08	2.98
4,111.00	22.08	195.07	3,984.13	-741.71	-162.90	-742.55	0.37

Design Report for GREENLEAF 29N-2HZ - Actual Surveys

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)
4,201.00	21.36	194.07	4,067.74	-773.94	-171.29	-774.83	0.90
4,291.00	19.90	193.70	4,151.97	-804.73	-178.90	-805.65	1.63
4,381.00	21.79	192.62	4,236.07	-835.91	-186.18	-836.87	2.14
4,471.00	20.94	192.66	4,319.89	-867.90	-193.35	-868.90	0.94
4,561.00	19.82	191.47	4,404.25	-898.55	-199.91	-899.58	1.33
4,651.00	21.76	194.83	4,488.39	-929.63	-207.22	-930.71	2.53
4,741.00	21.58	194.78	4,572.03	-961.76	-215.71	-962.88	0.20
4,831.00	20.75	193.83	4,655.96	-993.25	-223.74	-994.41	1.00
4,921.00	18.93	193.17	4,740.61	-1,022.95	-230.88	-1,024.14	2.04
5,011.00	20.51	193.70	4,825.33	-1,052.48	-237.94	-1,053.71	1.77
5,101.00	18.46	193.52	4,910.17	-1,081.66	-245.01	-1,082.92	2.28
5,191.00	19.78	195.48	4,995.21	-1,110.19	-252.40	-1,111.49	1.63
5,281.00	20.38	194.32	5,079.74	-1,140.05	-260.34	-1,141.40	0.80
5,371.00	19.69	193.64	5,164.29	-1,169.97	-267.80	-1,171.35	0.81
5,461.00	20.12	194.68	5,248.91	-1,199.68	-275.29	-1,201.10	0.62
5,550.00	17.70	196.51	5,333.10	-1,227.46	-283.02	-1,228.92	2.80
5,640.00	15.38	191.60	5,419.38	-1,252.27	-289.31	-1,253.77	3.01
5,731.00	13.70	190.80	5,507.46	-1,274.68	-293.75	-1,276.20	1.86
5,820.00	11.85	189.50	5,594.25	-1,294.05	-297.24	-1,295.59	2.10
5,910.00	11.93	188.19	5,682.32	-1,312.37	-300.09	-1,313.92	0.31
6,001.00	10.43	187.74	5,771.59	-1,329.84	-302.54	-1,331.41	1.65
6,091.00	9.43	186.65	5,860.25	-1,345.24	-304.49	-1,346.81	1.13
6,181.00	7.73	192.34	5,949.24	-1,358.47	-306.64	-1,360.06	2.11
6,361.00	3.53	206.41	6,128.34	-1,375.27	-311.69	-1,376.88	2.44
6,451.00	1.48	236.55	6,218.25	-1,378.39	-313.89	-1,380.02	2.63
6,541.00	1.26	57.03	6,308.24	-1,378.50	-314.03	-1,380.12	3.04
6,631.00	1.12	68.57	6,398.22	-1,377.64	-312.38	-1,379.25	0.31
6,676.00	2.23	23.14	6,443.20	-1,376.67	-311.63	-1,378.28	3.67
6,721.00	6.23	349.87	6,488.08	-1,373.46	-311.72	-1,375.07	10.07
6,811.00	15.79	356.29	6,576.32	-1,356.39	-313.37	-1,358.02	10.69
6,901.00	23.25	358.38	6,661.09	-1,326.38	-314.67	-1,328.00	8.32
6,991.00	32.59	355.62	6,740.53	-1,284.36	-317.03	-1,286.00	10.47
7,081.00	40.43	358.16	6,812.81	-1,230.93	-319.82	-1,232.59	8.87
7,171.00	49.93	0.58	6,876.18	-1,167.18	-320.41	-1,168.84	10.72
7,261.00	60.25	359.86	6,927.62	-1,093.48	-320.15	-1,095.14	11.49
7,352.00	68.63	357.14	6,966.85	-1,011.50	-322.37	-1,013.17	9.59
7,442.00	78.44	0.02	6,992.34	-925.33	-324.45	-927.01	11.32
7,532.00	86.85	359.50	7,003.85	-836.15	-324.83	-837.84	9.36
7,635.00	90.15	359.34	7,006.54	-733.20	-325.87	-734.90	3.21
7,725.00	89.82	358.40	7,006.57	-643.22	-327.64	-644.93	1.11
7,815.00	89.69	358.94	7,006.95	-553.25	-329.73	-554.97	0.62
7,905.00	89.14	0.25	7,007.87	-463.26	-330.37	-464.98	1.58
7,995.00	89.35	1.83	7,009.06	-373.28	-328.74	-375.00	1.77
8,085.00	88.37	1.66	7,010.85	-283.34	-326.00	-285.05	1.11
8,175.00	89.20	1.98	7,012.76	-193.41	-323.14	-195.10	0.99
8,265.00	89.32	2.16	7,013.92	-103.48	-319.89	-105.15	0.24
8,355.00	90.49	3.03	7,014.07	-13.57	-315.81	-15.23	1.62
8,445.00	89.91	2.50	7,013.75	76.32	-311.47	74.69	0.87
8,535.00	91.02	2.98	7,013.02	166.21	-307.17	164.60	1.34
8,625.00	90.52	2.35	7,011.81	256.11	-302.99	254.52	0.89
8,715.00	90.09	2.46	7,011.33	346.03	-299.21	344.46	0.49

Design Report for GREENLEAF 29N-2HZ - Actual Surveys

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)
8,805.00	89.48	1.94	7,011.67	435.96	-295.75	434.41	0.89
8,895.00	90.77	1.74	7,011.48	525.91	-292.86	524.37	1.45
8,985.00	90.55	0.60	7,010.44	615.89	-291.03	614.35	1.29
9,075.00	90.06	359.73	7,009.96	705.88	-290.77	704.35	1.11
9,165.00	90.40	359.79	7,009.60	795.88	-291.14	794.35	0.38
9,255.00	89.85	0.59	7,009.40	885.88	-290.85	884.34	1.08
9,345.00	88.98	359.13	7,010.32	975.87	-291.07	974.33	1.89
9,435.00	89.35	0.65	7,011.63	1,065.86	-291.24	1,064.32	1.74
9,525.00	90.15	0.97	7,012.03	1,155.85	-289.97	1,154.31	0.96
9,615.00	89.54	0.64	7,012.27	1,245.84	-288.70	1,244.31	0.77
9,705.00	88.46	359.63	7,013.84	1,335.82	-288.49	1,334.29	1.64
9,795.00	89.66	0.15	7,015.32	1,425.81	-288.66	1,424.28	1.45
9,885.00	88.77	0.33	7,016.55	1,515.80	-288.29	1,514.27	1.01
9,975.00	90.49	0.44	7,017.13	1,605.79	-287.68	1,604.26	1.92
10,065.00	91.30	359.68	7,015.72	1,695.78	-287.59	1,694.25	1.23
10,155.00	89.94	0.31	7,014.75	1,785.77	-287.59	1,784.24	1.67
10,245.00	89.05	359.50	7,015.54	1,875.76	-287.74	1,874.23	1.34
10,335.00	89.69	0.50	7,016.53	1,965.76	-287.74	1,964.22	1.32
10,424.00	89.75	0.34	7,016.97	2,054.75	-287.09	2,053.22	0.19
10,514.00	90.12	359.76	7,017.07	2,144.75	-287.01	2,143.22	0.76
10,604.00	90.00	358.76	7,016.98	2,234.74	-288.17	2,233.20	1.12
10,694.00	90.25	0.44	7,016.78	2,324.74	-288.80	2,323.19	1.89
10,784.00	89.72	359.89	7,016.80	2,414.74	-288.54	2,413.19	0.85
10,874.00	91.11	1.42	7,016.15	2,504.72	-287.52	2,503.18	2.30
10,964.00	90.96	0.78	7,014.53	2,594.69	-285.79	2,593.16	0.73
11,054.00	90.06	0.39	7,013.72	2,684.68	-284.87	2,683.15	1.09
11,144.00	88.86	358.29	7,014.57	2,774.67	-285.91	2,773.13	2.69
11,234.00	90.74	358.92	7,014.89	2,864.63	-288.10	2,863.09	2.20
11,324.00	89.48	357.54	7,014.71	2,954.59	-290.88	2,953.02	2.08
11,414.00	90.55	1.46	7,014.69	3,044.57	-291.66	3,043.00	4.51
11,504.00	89.17	0.48	7,014.91	3,134.55	-290.14	3,132.99	1.88
11,595.00	89.20	0.90	7,016.21	3,225.53	-289.04	3,223.98	0.46
11,685.00	90.09	0.15	7,016.76	3,315.53	-288.22	3,313.97	1.29
11,775.00	91.23	0.65	7,015.73	3,405.52	-287.59	3,403.96	1.38
11,865.00	90.68	359.63	7,014.23	3,495.50	-287.37	3,493.95	1.29
11,955.00	91.82	1.52	7,012.26	3,585.47	-286.47	3,583.92	2.45
12,045.00	91.66	0.55	7,009.53	3,675.41	-284.84	3,673.87	1.09
12,135.00	90.80	0.17	7,007.60	3,765.39	-284.28	3,763.85	1.04
12,316.00	89.54	359.21	7,007.06	3,946.38	-285.26	3,944.83	0.88
12,406.00	88.92	358.06	7,008.27	4,036.34	-287.40	4,034.78	1.45
12,490.00	88.55	358.00	7,010.12	4,120.27	-290.29	4,118.70	0.45
Last Sperry MWD Survey							
12,533.00	88.55	358.00	7,011.21	4,163.23	-291.79	4,161.65	0.00
Straight Projection to Bit							

Design Report for GREENLEAF 29N-2HZ - Actual Surveys

Design Annotations

Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
129.00	128.98	-0.89	1.69	First CES MWD Survey
1,250.00	1,249.87	4.12	3.50	Last CES MWD Survey
1,372.00	1,371.87	4.06	4.19	First Sperry MWD Survey
12,490.00	7,010.12	4,120.27	-290.29	Last Sperry MWD Survey
12,533.00	7,011.21	4,163.23	-291.79	Straight Projection to Bit

Vertical Section Information

Angle Type	Target	Azimuth (°)	Origin Type	Origin		Start TVD (usft)
				+N/-S (usft)	+E/-W (usft)	
User	No Target (Freehand)	0.30	Slot	0.00	0.00	0.00

Survey tool program

From (usft)	To (usft)	Survey/Plan	Survey Tool
129.00	1,250.00	Surface Gyro Surveys	MWD
1,372.00	7,532.00	MWD Vertical/Build Surveys	MWD+IFR1+SC
7,635.00	12,533.00	MWD Lateral Surveys	MWD+IFR1+SC

Casing Details

Measured Depth (usft)	Vertical Depth (usft)	Name	Casing Diameter (")	Hole Diameter (")
1,284.00	1,283.87	9 5/8"	9-5/8	13-3/4
7,570.00	7,005.53	7" @ 7570' MD	7	8-3/4

Design Report for GREENLEAF 29N-2HZ - Actual Surveys

Wellbore Targets

Target Name - hit/miss target - Shape	Dip Angle (°)	Dip Dir. (°)	TVD (usft)	+N/-S (usft)	+E/-W (usft)	Northing (usft)	Easting (usft)	Latitude	Longitude
GREENLEAF 29N-2H; - actual wellpath hits target center - Point	0.00	0.00	0.00	0.00	0.00	1,302,935.59	3,241,922.08	40.161712	-104.634400
GREENLEAF 29N-2H; - actual wellpath misses target center by 941.36usft at 2.76usft MD (2.76 TVD, 0.00 N, 0.00 E) - Point	0.00	0.00	0.00	-903.00	-266.00	1,302,030.08	3,241,664.91	40.159233	-104.635352
GREENLEAF 29N-2H; - actual wellpath hits target center - Polygon	0.00	0.00	0.00	0.00	0.00	1,302,935.59	3,241,922.08	40.161712	-104.634400
Point 1				0.00	-448.11	-811.92	1,302,479.60	3,241,114.60	
Point 2				0.00	872.79	-814.20	1,303,800.36	3,241,099.43	
Point 3				0.00	2,193.73	-816.47	1,305,121.16	3,241,084.27	
Point 4				0.00	3,506.35	-814.05	1,306,433.68	3,241,073.87	
Point 5				0.00	4,202.33	-812.78	1,307,129.61	3,241,068.35	
Point 6				0.00	4,178.23	107.22	1,307,114.49	3,241,988.50	
Point 7				0.00	3,494.25	105.97	1,306,430.56	3,241,993.93	
Point 8				0.00	2,182.15	103.57	1,305,118.56	3,242,004.34	
Point 9				0.00	864.13	105.84	1,303,800.68	3,242,019.47	
Point 10				0.00	-453.94	108.11	1,302,482.75	3,242,034.61	
Point 11				0.00	-1,322.54	102.68	1,301,614.17	3,242,037.66	
Point 12				0.00	-1,315.46	-817.33	1,301,612.27	3,241,117.66	
GREENLEAF 29N-2H; - actual wellpath hits target center - Polygon	0.00	0.00	0.00	0.00	0.00	1,302,935.59	3,241,922.08	40.161712	-104.634400
Point 1				0.00	4,683.65	-1,620.06	1,307,603.01	3,240,256.44	
Point 2				0.00	4,617.21	916.17	1,307,561.33	3,242,793.10	
Point 3				0.00	4,583.45	3,525.54	1,307,553.04	3,245,402.56	
Point 4				0.00	2,138.25	3,592.66	1,305,108.72	3,245,493.54	
Point 5				0.00	-476.75	3,664.47	1,302,494.65	3,245,590.87	
Point 6				0.00	-459.49	986.68	1,302,485.77	3,242,913.15	
Point 7				0.00	-442.54	-1,690.51	1,302,476.59	3,240,236.04	
Point 8				0.00	2,204.39	-1,663.01	1,305,123.55	3,240,237.70	
GREENLEAF 29N-2H; - actual wellpath misses target center by 37.38usft at 12533.00usft MD (7011.21 TVD, 4163.23 N, -291.79 E) - Point	0.00	0.00	6,987.00	4,188.33	-278.34	1,307,120.83	3,241,602.88	40.173209	-104.635396

Directional Difficulty Index

Average Dogleg over Survey:	2.01 °/100usft	Maximum Dogleg over Survey:	11.49 °/100usft at 7,261.00 usft
Net Tortosity applicable to Plans:	0.88 °/100usft	Directional Difficulty Index:	6.497

Audit Info

North Reference Sheet for Sec. 2-T2N-R65W - GREENLEAF 29N-2HZ - Plan A

All data is in US Feet unless otherwise stated. Directions and Coordinates are relative to True North Reference.

Vertical Depths are relative to RKB = 13' @ 4867.00usft (Ensign 145). Northing and Easting are relative to GREENLEAF 29N-2HZ

Coordinate System is US State Plane 1983, Colorado Northern Zone using datum North American Datum 1983, ellipsoid GRS 1980

Projection method is Lambert Conformal Conic (2 parallel)

Central Meridian is -105.500000°, Longitude Origin:0.000000°, Latitude Origin:40.783333°

False Easting: 3,000,000.00usft, False Northing: 1,000,000.00usft, Scale Reduction: 0.99995805

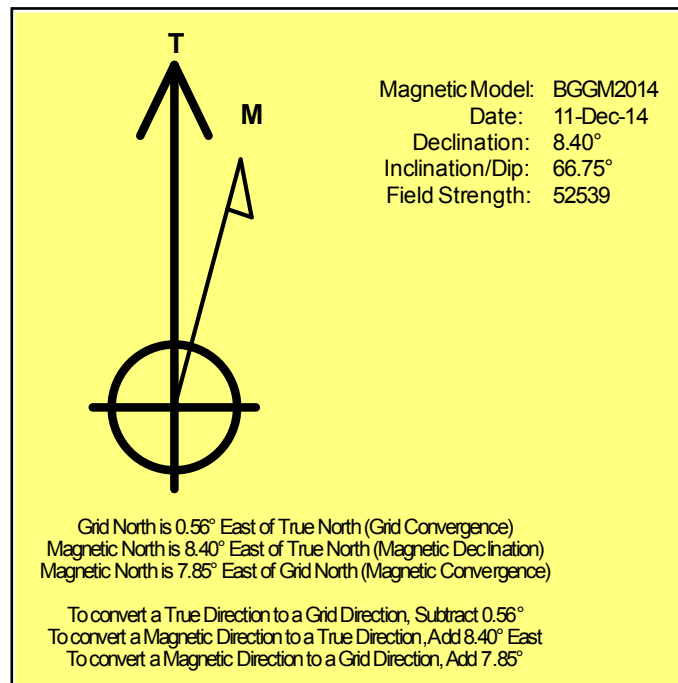
Grid Coordinates of Well: 1,302,935.59 usft N, 3,241,922.08 usft E

Geographical Coordinates of Well: 40° 09' 42.16" N, 104° 38' 03.84" W

Grid Convergence at Surface is: 0.56°

Based upon Minimum Curvature type calculations, at a Measured Depth of 12,533.00usft
the Bottom Hole Displacement is 4,173.45usft in the Direction of 355.99° (True).

Magnetic Convergence at surface is: -7.85° (11 December 2014, , BGGM2014)



Anadarko Petroleum Corp.

Weld County, CO (NAD 83)

Sec. 2-T2N-R65W

GREENLEAF 29N-2HZ

Plan A

Design: Actual Surveys

Sperry Drilling Services

Geodetic Report

25 March, 2015

Well Coordinates: 1,302,935.59 N, 3,241,922.08 E (40° 09' 42.16" N, 104° 38' 03.84" W)

Ground Level: 4,854.00 usft

Local Coordinate Origin:

Viewing Datum:

TVDs to System:

North Reference:

Unit System:

Geodetic Scale Factor Applied

Version: 5000.1 Build: 73

Centered on Well GREENLEAF 29N-2HZ

RKB = 13' @ 4867.00usft (Ensign 145)

N

True

Dec-Deg - API - US Survey Feet - Custom

HALLIBURTON

Design Report for GREENLEAF 29N-2HZ - Actual Surveys

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	Local Coordinates		Geographic Coordinates		UTM Coordinates	
				+N/-S (usft)	+E/-W (usft)	Latitude (usft)	Longitude (usft)	Northing (usft)	Easting (usft)
0.00	0.00	0.00	0.00	0.00	0.00	40.161712	-104.634400	1,302,935.59	3,241,922.08
129.00	1.70	117.80	128.98	-0.89	1.69	40.161710	-104.634394	1,302,934.71	3,241,923.78
208.00	1.00	142.70	207.96	-1.99	3.15	40.161707	-104.634389	1,302,933.63	3,241,925.24
287.00	0.80	120.70	286.95	-2.82	4.04	40.161704	-104.634386	1,302,932.81	3,241,926.14
367.00	1.00	334.90	366.95	-2.47	4.22	40.161705	-104.634385	1,302,933.16	3,241,926.32
447.00	1.20	350.10	446.93	-1.01	3.78	40.161709	-104.634387	1,302,934.61	3,241,925.87
527.00	1.30	333.20	526.91	0.62	3.23	40.161714	-104.634389	1,302,936.24	3,241,925.30
607.00	0.80	339.00	606.90	1.95	2.62	40.161717	-104.634391	1,302,937.57	3,241,924.68
687.00	1.20	325.30	686.89	3.16	1.94	40.161721	-104.634393	1,302,938.77	3,241,923.99
767.00	0.20	132.50	766.88	3.76	1.57	40.161722	-104.634395	1,302,939.36	3,241,923.61
847.00	0.50	66.00	846.88	3.81	1.99	40.161723	-104.634393	1,302,939.41	3,241,924.03
927.00	0.20	169.90	926.88	3.81	2.33	40.161723	-104.634392	1,302,939.42	3,241,924.37
1,007.00	0.40	74.30	1,006.88	3.75	2.63	40.161722	-104.634391	1,302,939.36	3,241,924.67
1,087.00	0.30	137.60	1,086.88	3.67	3.04	40.161722	-104.634389	1,302,939.29	3,241,925.08
1,167.00	0.30	1.40	1,166.88	3.72	3.18	40.161722	-104.634389	1,302,939.34	3,241,925.22
1,250.00	0.50	59.60	1,249.87	4.12	3.50	40.161723	-104.634388	1,302,939.75	3,241,925.54
1,372.00	0.38	146.00	1,371.87	4.06	4.19	40.161723	-104.634385	1,302,939.69	3,241,926.22
1,466.00	1.30	182.94	1,465.86	2.74	4.31	40.161720	-104.634385	1,302,938.36	3,241,926.36
1,559.00	2.33	185.28	1,558.81	-0.20	4.08	40.161712	-104.634386	1,302,935.43	3,241,926.16
1,653.00	4.60	191.46	1,652.64	-5.80	3.15	40.161696	-104.634389	1,302,929.82	3,241,925.29
1,747.00	6.11	195.53	1,746.22	-14.31	1.07	40.161673	-104.634396	1,302,921.29	3,241,923.28
1,841.00	7.36	193.90	1,839.57	-24.98	-1.72	40.161643	-104.634406	1,302,910.59	3,241,920.60
1,934.00	10.80	192.47	1,931.39	-39.27	-5.03	40.161604	-104.634418	1,302,896.27	3,241,917.43
2,028.00	13.55	191.88	2,023.27	-58.65	-9.20	40.161551	-104.634433	1,302,876.85	3,241,913.45
2,121.00	15.61	188.61	2,113.27	-81.69	-13.32	40.161488	-104.634448	1,302,853.78	3,241,909.55
2,214.00	17.97	189.30	2,202.30	-108.22	-17.51	40.161415	-104.634463	1,302,827.21	3,241,905.62
2,307.00	18.29	187.10	2,290.69	-136.86	-21.63	40.161336	-104.634478	1,302,798.53	3,241,901.78
2,401.00	20.77	191.02	2,379.27	-167.86	-26.64	40.161251	-104.634496	1,302,767.48	3,241,897.07
2,491.00	19.60	189.24	2,463.75	-198.43	-32.12	40.161167	-104.634515	1,302,736.87	3,241,891.90
2,581.00	20.55	191.71	2,548.28	-228.79	-37.75	40.161084	-104.634535	1,302,706.45	3,241,886.56
2,671.00	20.56	195.73	2,632.55	-259.47	-45.24	40.161000	-104.634562	1,302,675.69	3,241,879.37
2,761.00	19.84	195.70	2,717.02	-289.39	-53.66	40.160918	-104.634592	1,302,645.70	3,241,871.25
2,851.00	20.34	193.68	2,801.54	-319.29	-61.49	40.160836	-104.634620	1,302,615.72	3,241,863.71
2,941.00	20.71	192.20	2,885.83	-350.04	-68.55	40.160751	-104.634646	1,302,584.91	3,241,856.95
3,031.00	20.44	191.07	2,970.09	-381.02	-74.93	40.160666	-104.634668	1,302,553.87	3,241,850.87
3,121.00	20.55	194.88	3,054.40	-411.71	-82.01	40.160582	-104.634694	1,302,523.11	3,241,844.10
3,211.00	19.11	193.35	3,139.06	-441.31	-89.46	40.160501	-104.634720	1,302,493.44	3,241,836.93
3,301.00	20.16	192.62	3,223.82	-470.78	-96.25	40.160420	-104.634745	1,302,463.91	3,241,830.43
3,391.00	19.91	197.17	3,308.38	-500.56	-104.17	40.160338	-104.634773	1,302,434.05	3,241,822.80
3,481.00	20.43	194.43	3,392.86	-530.41	-112.61	40.160256	-104.634803	1,302,404.12	3,241,814.66
3,571.00	19.95	193.02	3,477.33	-560.59	-119.98	40.160173	-104.634830	1,302,373.88	3,241,807.58
3,661.00	18.75	190.90	3,562.25	-589.75	-126.17	40.160093	-104.634852	1,302,344.66	3,241,801.67

Design Report for GREENLEAF 29N-2HZ - Actual Surveys

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	Local Coordinates		Geographic Coordinates		UTM Coordinates	
				+N/-S (usft)	+E/-W (usft)	Latitude (usft)	Longitude (usft)	Northing (usft)	Easting (usft)
3,751.00	19.96	191.19	3,647.16	-619.03	-131.89	40.160013	-104.634872	1,302,315.33	3,241,796.24
3,841.00	20.44	194.38	3,731.63	-649.32	-138.77	40.159930	-104.634897	1,302,284.97	3,241,789.65
3,931.00	19.13	193.81	3,816.31	-678.86	-146.20	40.159849	-104.634923	1,302,255.36	3,241,782.52
4,021.00	21.76	195.27	3,900.64	-709.28	-154.11	40.159765	-104.634952	1,302,224.86	3,241,774.90
4,111.00	22.08	195.07	3,984.13	-741.71	-162.90	40.159676	-104.634983	1,302,192.35	3,241,766.43
4,201.00	21.36	194.07	4,067.74	-773.94	-171.29	40.159588	-104.635013	1,302,160.04	3,241,758.36
4,291.00	19.90	193.70	4,151.97	-804.73	-178.90	40.159503	-104.635040	1,302,129.19	3,241,751.05
4,381.00	21.79	192.62	4,236.07	-835.91	-186.18	40.159417	-104.635066	1,302,097.93	3,241,744.07
4,471.00	20.94	192.66	4,319.89	-867.90	-193.35	40.159330	-104.635092	1,302,065.87	3,241,737.21
4,561.00	19.82	191.47	4,404.25	-898.55	-199.91	40.159246	-104.635115	1,302,035.17	3,241,730.95
4,651.00	21.76	194.83	4,488.39	-929.63	-207.22	40.159160	-104.635142	1,302,004.01	3,241,723.95
4,741.00	21.58	194.78	4,572.03	-961.76	-215.71	40.159072	-104.635172	1,301,971.80	3,241,715.77
4,831.00	20.75	193.83	4,655.96	-993.25	-223.74	40.158986	-104.635201	1,301,940.24	3,241,708.05
4,921.00	18.93	193.17	4,740.61	-1,022.95	-230.88	40.158904	-104.635226	1,301,910.48	3,241,701.20
5,011.00	20.51	193.70	4,825.33	-1,052.48	-237.94	40.158823	-104.635252	1,301,880.88	3,241,694.43
5,101.00	18.46	193.52	4,910.17	-1,081.66	-245.01	40.158743	-104.635277	1,301,851.64	3,241,687.65
5,191.00	19.78	195.48	4,995.21	-1,110.19	-252.40	40.158665	-104.635303	1,301,823.04	3,241,680.53
5,281.00	20.38	194.32	5,079.74	-1,140.05	-260.34	40.158583	-104.635332	1,301,793.10	3,241,672.88
5,371.00	19.69	193.64	5,164.29	-1,169.97	-267.80	40.158500	-104.635358	1,301,763.11	3,241,665.72
5,461.00	20.12	194.68	5,248.91	-1,199.68	-275.29	40.158419	-104.635385	1,301,733.33	3,241,658.52
5,550.00	17.70	196.51	5,333.10	-1,227.46	-283.02	40.158343	-104.635413	1,301,705.48	3,241,651.06
5,640.00	15.38	191.60	5,419.38	-1,252.27	-289.31	40.158275	-104.635435	1,301,680.60	3,241,645.02
5,731.00	13.70	190.80	5,507.46	-1,274.68	-293.75	40.158213	-104.635451	1,301,658.15	3,241,640.79
5,820.00	11.85	189.50	5,594.25	-1,294.05	-297.24	40.158160	-104.635464	1,301,638.75	3,241,637.50
5,910.00	11.93	188.19	5,682.32	-1,312.37	-300.09	40.158110	-104.635474	1,301,620.41	3,241,634.82
6,001.00	10.43	187.74	5,771.59	-1,329.84	-302.54	40.158062	-104.635483	1,301,602.91	3,241,632.55
6,091.00	9.43	186.65	5,860.25	-1,345.24	-304.49	40.158019	-104.635490	1,301,587.50	3,241,630.75
6,181.00	7.73	192.34	5,949.24	-1,358.47	-306.64	40.157983	-104.635497	1,301,574.24	3,241,628.73
6,361.00	3.53	206.41	6,128.34	-1,375.27	-311.69	40.157937	-104.635515	1,301,557.40	3,241,623.84
6,451.00	1.48	236.55	6,218.25	-1,378.39	-313.89	40.157928	-104.635523	1,301,554.25	3,241,621.67
6,541.00	1.26	57.03	6,308.24	-1,378.50	-314.03	40.157928	-104.635524	1,301,554.15	3,241,621.53
6,631.00	1.12	68.57	6,398.22	-1,377.64	-312.38	40.157930	-104.635518	1,301,555.02	3,241,623.17
6,676.00	2.23	23.14	6,443.20	-1,376.67	-311.63	40.157933	-104.635515	1,301,556.00	3,241,623.91
6,721.00	6.23	349.87	6,488.08	-1,373.46	-311.72	40.157942	-104.635515	1,301,559.21	3,241,623.79
6,811.00	15.79	356.29	6,576.32	-1,356.39	-313.37	40.157989	-104.635521	1,301,576.26	3,241,621.97
6,901.00	23.25	358.38	6,661.09	-1,326.38	-314.67	40.158071	-104.635526	1,301,606.26	3,241,620.38
6,991.00	32.59	355.62	6,740.53	-1,284.36	-317.03	40.158186	-104.635534	1,301,648.25	3,241,617.62
7,081.00	40.43	358.16	6,812.81	-1,230.93	-319.82	40.158333	-104.635544	1,301,701.64	3,241,614.30
7,171.00	49.93	0.58	6,876.18	-1,167.18	-320.41	40.158508	-104.635547	1,301,765.38	3,241,613.09
7,261.00	60.25	359.86	6,927.62	-1,093.48	-320.15	40.158710	-104.635546	1,301,839.08	3,241,612.62
7,352.00	68.63	357.14	6,966.85	-1,011.50	-322.37	40.158935	-104.635554	1,301,921.03	3,241,609.61
7,442.00	78.44	0.02	6,992.34	-925.33	-324.45	40.159172	-104.635561	1,302,007.17	3,241,606.69

Design Report for GREENLEAF 29N-2HZ - Actual Surveys

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	Local Coordinates		Geographic Coordinates		UTM Coordinates	
				+N/-S (usft)	+E/-W (usft)	Latitude (usft)	Longitude (usft)	Northing (usft)	Easting (usft)
7,532.00	86.85	359.50	7,003.85	-836.15	-324.83	40.159417	-104.635562	1,302,096.34	3,241,605.44
7,635.00	90.15	359.34	7,006.54	-733.20	-325.87	40.159699	-104.635566	1,302,199.27	3,241,603.39
7,725.00	89.82	358.40	7,006.57	-643.22	-327.64	40.159946	-104.635572	1,302,289.22	3,241,600.74
7,815.00	89.69	358.94	7,006.95	-553.25	-329.73	40.160193	-104.635580	1,302,379.17	3,241,597.77
7,905.00	89.14	0.25	7,007.87	-463.26	-330.37	40.160440	-104.635582	1,302,469.15	3,241,596.26
7,995.00	89.35	1.83	7,009.06	-373.28	-328.74	40.160687	-104.635576	1,302,559.13	3,241,597.01
8,085.00	88.37	1.66	7,010.85	-283.34	-326.00	40.160934	-104.635567	1,302,649.09	3,241,598.87
8,175.00	89.20	1.98	7,012.76	-193.41	-323.14	40.161181	-104.635556	1,302,739.04	3,241,600.85
8,265.00	89.32	2.16	7,013.92	-103.48	-319.89	40.161428	-104.635545	1,302,829.00	3,241,603.23
8,355.00	90.49	3.03	7,014.07	-13.57	-315.81	40.161675	-104.635530	1,302,918.93	3,241,606.42
8,445.00	89.91	2.50	7,013.75	76.32	-311.47	40.161922	-104.635515	1,303,008.86	3,241,609.89
8,535.00	91.02	2.98	7,013.02	166.21	-307.17	40.162168	-104.635499	1,303,098.79	3,241,613.31
8,625.00	90.52	2.35	7,011.81	256.11	-302.99	40.162415	-104.635484	1,303,188.71	3,241,616.62
8,715.00	90.09	2.46	7,011.33	346.03	-299.21	40.162662	-104.635471	1,303,278.66	3,241,619.52
8,805.00	89.48	1.94	7,011.67	435.96	-295.75	40.162909	-104.635458	1,303,368.62	3,241,622.09
8,895.00	90.77	1.74	7,011.48	525.91	-292.86	40.163156	-104.635448	1,303,458.59	3,241,624.10
8,985.00	90.55	0.60	7,010.44	615.89	-291.03	40.163403	-104.635442	1,303,548.58	3,241,625.06
9,075.00	90.06	359.73	7,009.96	705.88	-290.77	40.163650	-104.635441	1,303,638.57	3,241,624.44
9,165.00	90.40	359.79	7,009.60	795.88	-291.14	40.163897	-104.635442	1,303,728.55	3,241,623.19
9,255.00	89.85	0.59	7,009.40	885.88	-290.85	40.164144	-104.635441	1,303,818.55	3,241,622.61
9,345.00	88.98	359.13	7,010.32	975.87	-291.07	40.164391	-104.635442	1,303,908.53	3,241,621.51
9,435.00	89.35	0.65	7,011.63	1,065.86	-291.24	40.164638	-104.635442	1,303,998.51	3,241,620.46
9,525.00	90.15	0.97	7,012.03	1,155.85	-289.97	40.164885	-104.635438	1,304,088.50	3,241,620.85
9,615.00	89.54	0.64	7,012.27	1,245.84	-288.70	40.165132	-104.635433	1,304,178.49	3,241,621.24
9,705.00	88.46	359.63	7,013.84	1,335.82	-288.49	40.165379	-104.635432	1,304,268.47	3,241,620.57
9,795.00	89.66	0.15	7,015.32	1,425.81	-288.66	40.165626	-104.635433	1,304,358.45	3,241,619.52
9,885.00	88.77	0.33	7,016.55	1,515.80	-288.29	40.165873	-104.635432	1,304,448.43	3,241,619.02
9,975.00	90.49	0.44	7,017.13	1,605.79	-287.68	40.166120	-104.635430	1,304,538.42	3,241,618.75
10,065.00	91.30	359.68	7,015.72	1,695.78	-287.59	40.166367	-104.635429	1,304,628.40	3,241,617.96
10,155.00	89.94	0.31	7,014.75	1,785.77	-287.59	40.166614	-104.635429	1,304,718.39	3,241,617.08
10,245.00	89.05	359.50	7,015.54	1,875.76	-287.74	40.166861	-104.635430	1,304,808.37	3,241,616.05
10,335.00	89.69	0.50	7,016.53	1,965.76	-287.74	40.167108	-104.635430	1,304,898.36	3,241,615.17
10,424.00	89.75	0.34	7,016.97	2,054.75	-287.09	40.167352	-104.635428	1,304,987.35	3,241,614.95
10,514.00	90.12	359.76	7,017.07	2,144.75	-287.01	40.167599	-104.635427	1,305,077.35	3,241,614.15
10,604.00	90.00	358.76	7,016.98	2,234.74	-288.17	40.167846	-104.635431	1,305,167.32	3,241,612.11
10,694.00	90.25	0.44	7,016.78	2,324.74	-288.80	40.168093	-104.635434	1,305,257.30	3,241,610.61
10,784.00	89.72	359.89	7,016.80	2,414.74	-288.54	40.168341	-104.635433	1,305,347.29	3,241,609.99
10,874.00	91.11	1.42	7,016.15	2,504.72	-287.52	40.168588	-104.635429	1,305,437.28	3,241,610.14
10,964.00	90.96	0.78	7,014.53	2,594.69	-285.79	40.168835	-104.635423	1,305,527.26	3,241,610.99
11,054.00	90.06	0.39	7,013.72	2,684.68	-284.87	40.169082	-104.635420	1,305,617.25	3,241,611.03
11,144.00	88.86	358.29	7,014.57	2,774.67	-285.91	40.169329	-104.635423	1,305,707.21	3,241,609.11
11,234.00	90.74	358.92	7,014.89	2,864.63	-288.10	40.169576	-104.635431	1,305,797.15	3,241,606.04

Design Report for GREENLEAF 29N-2HZ - Actual Surveys

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	Local Coordinates		Geographic Coordinates		UTM Coordinates	
				+N/-S (usft)	+E/-W (usft)	Latitude (usft)	Longitude (usft)	Northing (usft)	Easting (usft)
11,324.00	89.48	357.54	7,014.71	2,954.59	-290.88	40.169822	-104.635441	1,305,887.07	3,241,602.39
11,414.00	90.55	1.46	7,014.69	3,044.57	-291.66	40.170069	-104.635444	1,305,977.03	3,241,600.72
11,504.00	89.17	0.48	7,014.91	3,134.55	-290.14	40.170316	-104.635438	1,306,067.02	3,241,601.37
11,595.00	89.20	0.90	7,016.21	3,225.53	-289.04	40.170566	-104.635435	1,306,158.01	3,241,601.58
11,685.00	90.09	0.15	7,016.76	3,315.53	-288.22	40.170813	-104.635432	1,306,248.00	3,241,601.52
11,775.00	91.23	0.65	7,015.73	3,405.52	-287.59	40.171060	-104.635429	1,306,337.99	3,241,601.27
11,865.00	90.68	359.63	7,014.23	3,495.50	-287.37	40.171307	-104.635429	1,306,427.97	3,241,600.61
11,955.00	91.82	1.52	7,012.26	3,585.47	-286.47	40.171554	-104.635425	1,306,517.94	3,241,600.64
12,045.00	91.66	0.55	7,009.53	3,675.41	-284.84	40.171801	-104.635420	1,306,607.89	3,241,601.38
12,135.00	90.80	0.17	7,007.60	3,765.39	-284.28	40.172048	-104.635418	1,306,697.86	3,241,601.07
12,316.00	89.54	359.21	7,007.06	3,946.38	-285.26	40.172545	-104.635421	1,306,878.83	3,241,598.33
12,406.00	88.92	358.06	7,008.27	4,036.34	-287.40	40.172792	-104.635429	1,306,968.76	3,241,595.30
12,490.00	88.55	358.00	7,010.12	4,120.27	-290.29	40.173022	-104.635439	1,307,052.66	3,241,591.60
12,533.00	88.55	358.00	7,011.21	4,163.23	-291.79	40.173140	-104.635444	1,307,095.60	3,241,589.68

Design Annotations

Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
129.00	128.98	-0.89	1.69	First CES MWD Survey
1,250.00	1,249.87	4.12	3.50	Last CES MWD Survey
1,372.00	1,371.87	4.06	4.19	First Sperry MWD Survey
12,490.00	7,010.12	4,120.27	-290.29	Last Sperry MWD Survey
12,533.00	7,011.21	4,163.23	-291.79	Straight Projection to Bit

Vertical Section Information

Angle Type	Target	Azimuth (°)	Origin Type	Origin		Start TVD (usft)
				+N/_S (usft)	+E/-W (usft)	
User	No Target (Freehand)	0.30	Slot	0.00	0.00	0.00

Survey tool program

From (usft)	To (usft)	Survey/Plan	Survey Tool
129.00	1,250.00	Surface Gyro Surveys	MWD
1,372.00	7,532.00	MWD Vertical/Build Surveys	MWD+IFR1+SC
7,635.00	12,533.00	MWD Lateral Surveys	MWD+IFR1+SC

Design Report for GREENLEAF 29N-2HZ - Actual Surveys

Casing Details

Measured Depth (usft)	Vertical Depth (usft)	Name	Casing Diameter (")	Hole Diameter (")
1,284.00	1,283.87	9 5/8"	9-5/8	13-3/4
7,570.00	7,005.53	7" @ 7570' MD	7	8-3/4

Design Targets

Shape	Target Name	TVD ()	Northing ()	Easting ()	+N/-S	+E/-W	Created	Updated
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Directional Difficulty Index

Average Dogleg over Survey:	2.01 °/100usft	Maximum Dogleg over Survey:	11.49 °/100usft at 7,261.00 usft
Net Tortousity applicable to Plans:	0.88 °/100usft	Directional Difficulty Index:	6.497

Audit Info

North Reference Sheet for Sec. 2-T2N-R65W - GREENLEAF 29N-2HZ - Plan A

All data is in US Feet unless otherwise stated. Directions and Coordinates are relative to True North Reference.

Vertical Depths are relative to RKB = 13' @ 4867.00usft (Ensign 145). Northing and Easting are relative to GREENLEAF 29N-2HZ

Coordinate System is US State Plane 1983, Colorado Northern Zone using datum North American Datum 1983, ellipsoid GRS 1980

Projection method is Lambert Conformal Conic (2 parallel)

Central Meridian is -105.500000°, Longitude Origin:0.000000°, Latitude Origin:40.783333°

False Easting: 3,000,000.00usft, False Northing: 1,000,000.00usft, Scale Reduction: 0.99995805

Grid Coordinates of Well: 1,302,935.59 usft N, 3,241,922.08 usft E

Geographical Coordinates of Well: 40° 09' 42.16" N, 104° 38' 03.84" W

Grid Convergence at Surface is: 0.56°

Based upon Minimum Curvature type calculations, at a Measured Depth of 12,533.00usft

the Bottom Hole Displacement is 4,173.45usft in the Direction of 355.99° (True).

Magnetic Convergence at surface is: -7.85° (11 December 2014, , BGGM2014)

